

AD-A276 717



2

1993
Executive Research Project
F14

Conventional Arms Transfers

DTIC

EXECTE

MAR 09 1994

S

F

D

Lieutenant Colonel
George F. Hafkemeyer
U.S. Army

Faculty Research Advisor
Dr. Rolf H. Clark

94-07680



This document has been approved
for public release and sale; its
distribution is unlimited.

The Industrial College of the Armed Forces
National Defense University
Fort McNair, Washington, D.C. 20319-6000

9 4 3 8 1 2 6

DTIC QUALITY INSPECTED 5

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION Unclassified			1b. RESTRICTIVE MARKINGS		
2a. SECURITY CLASSIFICATION AUTHORITY N/A			3. DISTRIBUTION/AVAILABILITY OF REPORT Distribution Statement A: Approved for public release; distribution is unlimited.		
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE N/A					
4. PERFORMING ORGANIZATION REPORT NUMBER(S) NDU-ICAF-93- F14			5. MONITORING ORGANIZATION REPORT NUMBER(S) Same		
6a. NAME OF PERFORMING ORGANIZATION Industrial College of the Armed Forces		6b. OFFICE SYMBOL (If applicable) ICAF-FAP	7a. NAME OF MONITORING ORGANIZATION National Defense University		
6c. ADDRESS (City, State, and ZIP Code) Fort Lesley J. McNair Washington, D.C. 20319-6000			7b. ADDRESS (City, State, and ZIP Code) Fort Lesley J. McNair Washington, D.C. 20319-6000		
8a. NAME OF FUNDING/SPONSORING ORGANIZATION		8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER		
8c. ADDRESS (City, State, and ZIP Code)			10. SOURCE OF FUNDING NUMBERS		
		PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO.	WORK UNIT ACCESSION NO.
11. TITLE (Include Security Classification) <i>Conventional Arms Transfers</i>					
12. PERSONAL AUTHOR(S) <i>George F. Hoffkemeier</i>					
13a. TYPE OF REPORT Research		13b. TIME COVERED FROM <i>Aug 92</i> TO <i>Apr 93</i>		14. DATE OF REPORT (Year, Month, Day) April 1993	
15. PAGE COUNT <i>34</i>					
16. SUPPLEMENTARY NOTATION					
17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)		
FIELD	GROUP	SUB-GROUP			
19. ABSTRACT (Continue on reverse if necessary and identify by block number) SEE ATTACHED					
20. DISTRIBUTION/AVAILABILITY OF ABSTRACT <input checked="" type="checkbox"/> UNCLASSIFIED/UNLIMITED <input checked="" type="checkbox"/> SAME AS RPT. <input type="checkbox"/> DTIC USERS			21. ABSTRACT SECURITY CLASSIFICATION Unclassified		
22a. NAME OF RESPONSIBLE INDIVIDUAL Judy Clark			22b. TELEPHONE (Include Area Code) (202) 475-1889		22c. OFFICE SYMBOL ICAF-FAP

"Conventional Arms Transfers"

LTC George F. Hafkemeyer

Abstract

This paper surveys conventional arms transfers in the late 1980s. It covers who the major buyers and sellers were. It describes the methods a country may use to ease the economic burdens of arms transfers, to develop an arms industry, and to gain access to advanced technology. Discussed in broad terms are the policy options a country faces in choosing to enter into or refrain from arms exports. The paper concludes arms industries are so widespread, the processes are so internationalized, and provide such economic gains that to attempt to unilaterally control either their spread or their products is not productive.

**1993
Executive Research Project
F14**

Conventional Arms Transfers

**Lieutenant Colonel
George F. Hafkemeyer
U.S. Army**

Faculty Research Advisor
Dr. Rolf H. Clark



**The Industrial College of the Armed Forces
National Defense University
Fort McNair, Washington, D.C. 20319-6000**

Accession For		
NTIS	CRA&I	<input checked="checked" type="checkbox"/>
DTIC	TAB	<input type="checkbox"/>
Unannounced		<input type="checkbox"/>
Justification		
By		
Distribution /		
Availability Codes		
Dist	Avail and/or Special	
A-1		

DISCLAIMER

This research report represents the views of the author and does not necessarily reflect the official opinion of the Industrial College of the Armed Forces, the National Defense University, or the Department of Defense.

This document is the property of the United States Government and is not to be reproduced in whole or in part for distribution outside the federal executive branch without permission of the Director of Research and Publications, Industrial College of the Armed Forces, Fort Lesley J. McNair, Washington, D.C. 20319-6000.

Conventional Arms Transfers

Introduction

Over sixty nations engage in the international sale of conventional arms. Some provide new material; others export previously imported goods. In spite of the recent changes in the world's political landscape, strong enough feelings of insecurity still exist in many parts of the world to suggest a continued need to produce arms domestically or to import them. In 1989, worldwide arms transfers amounted to \$45 billion.¹

International sales of arms directly link two political and economic issues: the proliferation of arms and the health of the economies doing the buying and selling. These recent changes in the dynamics of the arms industry affect both issues:

- the spread of high technology industries
- increasing overlap of civil and military industry technology
- the growing costs of military products
- the formation of regional trading pacts as in Europe and North America²

The five permanent members of the UN Security Council and Germany sell 80 percent of the world's arms exports; the United States was second only to the USSR in annual international arms sales. The Stockholm International Peace Research Institute estimated the US captured 40 percent of the world arms transfers in 1990.³ In an era of smaller US defense budgets and no worldwide threat, the corporate desire to expand international sales will cause internal discussions of the US policies. Indeed, Raytheon already stated it wants to double its international sales from 20 to 40 percent of its

defense business in five years.⁴

In this paper, I survey why and how countries enter the arms manufacturing business, the size of the markets and who is selling, how countries advance to increasing levels of technological sophistication, and finally, policy issues that face the US and others.

Rationale for Arms Industries

There are several reasons to develop an arms industry within a country. The most basic is because the country perceives a long term threat to its survival, its territory, or its independence. The ability to produce military goods internally is thought to be an asset as the country will be less susceptible to attempts at influence by other supplier nations. More developed nations are not always regarded as reliable suppliers and the US may be its own enemy in this regard as it attempts to control arms buildups. It did not escape notice that, during the 1965 and 1971 hostilities between India and Pakistan, the US cut sales to India to influence the situation. India has since developed a defense industrial base for self reliance. Argentina shared a similar experience during the Falklands War. Brazil cut its own arms import relationship with the US in response to President Carter's policy of stressing human rights and his perception of a lack of military need in the region. A defense industry can reduce dependence on outside suppliers, particularly for spare parts that are frequently the first and simplest items a country tries to manufacture.

There is a definite economic benefit to having a defense industry. The most immediate benefits are the direct creation of jobs and the retention in the country of

capital that otherwise would be spent outside the country. In developing countries with high unemployment and small budgets, these alone may be significant enough to develop a defense industry. As the industry matures, and if it begins to export, there are opportunities for positive foreign exchange.

Equally important, once the industry gains minimal experience at production and production management, there are opportunities through licensing and offset agreements to accelerate the assimilation of technological experience that may be useful in further defense work or in the civilian sector. Besides providing experience and technology, these agreements reduce the cost of the finished product within the producing country. Offsets of various types have become a common part of arms sales.

If a defense industry exists within a country to produce for that country's consumption and that consumption is low relative to capacity, then exporting arms can reduce the burden on the domestic economy of supporting the industry and the domestic defense organization. By increasing the production base, facility costs as well as research and development costs decline on a per item basis. Thus, Israel, Brazil, and China aggressively seek international sales to reduce domestic weapons procurement costs.

The US is unique in that only in the US do private firms supply most of the military goods used and, further, the US consumes 90 percent of its defense production domestically. Nevertheless, even here there is increasing pressure to further international sales to support domestic programs. In joint testimony before Congress, the State Department and US Defense Security Assistance Agency stated:

"Unless we adjust to the challenge of an increasingly diverse international

defense supply environment, the US will be unable to address satisfactorily the legitimate defense needs of our friends and allies, and thereby our own, at an acceptable cost in the coming years. Indeed the long term survival of a number of domestic arms programs are tied to foreign sales: the M1A1 Abrams battle tank, the Blackhawk helicopter, the Hawk surface to air missile, the Boeing 707 aircraft to name a few."⁵

One should note that the volume of sales is relative to the economy producing it. Although the US consumes most of its defense production, its exports of military equipment and technology exceed those of our allies combined.

Europeans export substantial amounts of their military production, approaching 90 percent. Only one country, Japan, has a policy that prohibits the export of arms.⁶

The difference in the percentage of production sold abroad has significant impact. Because the domestic markets in Europe are so small, producers needed to export to reach economies of scale. This need fostered a different attitude during development: Europeans are more interested during development in producing an article that is adaptable to customer needs. US producers, recognizing the vast majority of production is for the US government, are more likely to offer a perhaps detuned version of the US item, with less allowance for customer preferences. With the worldwide market declining, this attitude may be a hindrance to US industry expansion internationally.

Finally, a country can sell arms internationally to enhance their stature or as a foreign policy instrument to influence others. The USSR, Syria, and Israel fall into this category specifically.

These rationales for a domestic arms industry are not mutually exclusive. Many countries will develop arms industries and export military goods to serve more than one function. Clearly this is the case in the US where the goals are increasing the customer base and revenues to reduce costs, continued production and employment, and latent influence. In high technology manufacturing, the stakes are high. It is estimated that if McDonnell Douglas closed its F15 plant in St. Louis because of lack of demand, seven thousand employees and several thousand subcontractors would be laid off.⁷

Arms Transfers⁸

As mentioned, world arms transfers in 1989 totaled \$45 billion, a ten-year low. This is a drop of 18 percent from 1988 and a total drop of 28 percent from the high level of \$63 billion in 1987. From 1985 through 1989, there was an average annual decline of 4 percent. The 1989 figure of \$45 billion in transfers represents 1.5 percent of the total world trade and is also a percentage declining since 1984.

Most of the 1989 world arms transfers, 76.4 percent or \$34.6 billion were transfers to developing nations. This is a substantial decrease from previous levels. Imports into developed countries totaled \$10.7 or 23.6 percent of the world totals.

The majority of the world arms transfers continue to be to the Middle East, 26.6 percent. In the aftermath of the Gulf War, the figures for this region will remain high in the near term. Other regions with significant imports include Europe with 24 percent of the world arms imports and South Asia with 17.4 percent of the total. In 1989, Saudi Arabia was the world's largest importer of arms with 4.5 percent of her GDP or 21.2 percent of her total imports being arms transfers. From 1983 through 1989,

however, Iraq was by far the largest recipient of arms transfers in the world, outspending Saudi Arabia, the next largest by \$10 billion. Afghanistan and India were the second and third largest importers in the world in 1989. Internal trade figures are not available for Afghanistan. Indian arms imports, however, consumed 1.3 percent of the GDP or 17.1 percent of Indian total imports.

The ten countries listed below account for 98 percent of the 1989 world arms exports. They are listed with arms exports as a percentage of that country's GDP (AE/GDP) and with arms exports as a percentage of that country's total exports.

	Exports	AE/GDP	% Total Exports
USSR	\$19.6 bil	.7	17.9
US	\$11.2 bil	.2	3.1
United Kingdom	\$3 bil	.4	2.0
France	\$2.7 bil	.3	1.5
China	\$2 bil	.3	3.9
W. Germany	\$1.2 bil	.1	.4
Czechoslovakia	\$.875 bil	.7	6.6
Israel	\$.625 bil	.1	5.8
Sweden	\$.575 bil	.3	1.1
Canada	\$.410 bil	.1	0.3

While the countries at the bottom of this list vary from year to year, the top five do not. They account for 80 percent of the world's arms exports.

The Soviet Union sold primarily to developing nations and primarily in the

Middle East and South Asia. Sales to these two geographic areas account for almost half of the Soviet sales. Iraq, India, and Afghanistan were the Soviet Union's major trading partners, followed by Vietnam, Cuba and Syria. Although Russia continues to sell arms for currency, Russia is unlikely to regain the dominance the USSR held in the marketplace. This is due to abandoning communism, the slower business cycle, moves by Third World nations to self sufficiency, and a shift of Third World countries from conventional to non conventional arms.⁹

Forty-one percent of arms transfers by the US are to Europe and Australia. Arms sales to developing nations by the US generally focus on a very small group of countries: Egypt, Israel, Pakistan, Saudi Arabia, the Republic of Korea, and Taiwan. The focus was on the foreign policy provision of materiel for security, rather than concentrating on commercial sales for revenue. Therefore, although the amount of sales since 1985 to these countries was considerable, \$8 to 12 billion, the US funded from 30 to 40 percent of the total sales through grants or nonrepayable military assistance (\$3 billion).¹⁰ Although seeking to gain self sufficiency in arms, Japan has been a significant customer of the US, receiving about 9 percent of the US international transfers.

The US share of the total world market declined from 37 percent in 1982 to approximately 30 percent in 1989. To compete successfully, the US had to offer offsets of profit, jobs, and technology transfer.¹¹

Ninety percent of the French arms transfers were to developing nations, again primarily in the Middle East and primarily with oil producing countries. In 1989, Saudi

Arabia and Iraq accounted for almost half France's arms transfers with Saudi Arabia by far France's largest customer with almost 39 percent of sales. Iraq and India each took about 10 percent of the total transfers. The French achieved success in the sales by allowing technology transfers and by providing ready to operate plants.¹²

Arms transfers by the United Kingdom went to two countries primarily: Saudi Arabia and the United States. Saudi Arabia consumed half the UK's foreign sales and with sales to the US included, made up 70 percent of the UK's total arms exports. India is the UK's only other customer of any significance.

Arms transfers by China follow the same pattern as that of the other major exporters: exports almost exclusively to developing nations (99.9 percent of the total Chinese exports), with those nations being in the Middle East. China was somewhat unusual in that just over a third of the Chinese exports were made to Iran. The Chinese made arms sales to smaller customers such as Thailand on a concessional basis. These sales were sometimes for as little as 10 percent of the sales value, with payments waived for ten years.¹³

Strategies for Nations Purchasing Arms

Once a country decides to enter into arms transfers, the question what type of participation will occur immediately arises. In each economy, there is a tension between wanting to acquire defense goods and not wanting to overspend to do so. The desire is to break the sale down to find ways to reduce overall cost or to at least spend part of the money locally to help the domestic economy. Arms suppliers, on the other hand, would prefer to sell finished products - the profit potential is larger, there is a greater

ability to recoup research and development costs, and there are fewer coordination problems.

As a nation develops technological resources, one way it can reduce the cost of defense articles is through equipment rebuilds and upgrades. This produces a longer useful equipment life, potentially with better performance, at less cost than that of a new article. Simultaneously, the nation gains additional technological experience in the field and experience in management of the projects. Israel gained experience in the aerospace field and a fifteen-year addition to the service life of F4's by upgrading the engines and structure to improve performance. India did a major upgrade on the Vickers main battle tank. Brazil gained experience in armored vehicle construction during a modification of Stuart tanks to the Brazilian X1A1 configuration.¹⁴

Once a country develops a minimum level of technological assets, there are other ways for a country to acquire defense goods at reduced cost. In his article "International Collaboration in Armaments Production; A Second Best Solution," Ethan Kapstein discusses the relationships between various common offsets and the purchaser's financial and technological abilities. If the purchasing nation has limited financial resources and limited technological ability, the nation will probably conduct an outright purchase. If there are financial resources, but technological assets are weak, the country will usually try to enter a coproduction agreement. If financial assets are weak, but technological assets are strong, the country will frequently push for codevelopment. If both financial assets and technological resources are present, most nations would try autonomous development and production. The sequence from most wanted to least wanted is

autonomous production, codevelopment, coproduction, and purchase.¹⁵

Newly industrialized nations may be able to build existing designs, but have problems designing and building new systems. Licensing of production may then be the next step. There are frequent sales in which the US company manufactures the initial quantities of goods in the US, the purchasing country assembles a second set of goods under a license, perhaps as kits in the purchasing country, and, finally, full licensed production of follow-on quantities in the licensed country begins. Buyers frequently request these arrangements and a major point for bid evaluation may be which proposal includes the greatest technology transfer.¹⁶

Licensed production is a major vehicle for technology transfer as it passes on the knowledge on how to manufacture an item. It is an attractive way to build up an industrial capability, gaining knowledge and experience. Most common is component manufacture under license. However, entire systems are being licensed. Thirty-five percent of Israeli electronic manufacturing results from US licensing.¹⁷ In 1988 alone India, Egypt, Indonesia, South Korea, Taiwan, and Brazil were producing 43 different major systems under license arrangements; several countries reached a position where they are exporting the systems. The US is the leader in granting licensing. During the same 1988 timeframe, seventy US systems were being produced under license arrangements by other countries. This number of systems under license to foreign countries is equal to the total licensed systems of the rest of NATO and the USSR.¹⁸

Coproduction provides the buyer the ability to learn state of the art technology as well as to reduce the cost of the item. Coproduction generally takes place between

technologically advanced groups, such as the US, Belgium, the Netherlands, Denmark, and Norway joining to produce the F16. However, many Third World governments now request all major arms import transactions allow for at least some coproduction or assembly in the local economy.

All arms producing countries except the US and Japan have adopted policies to collaborate with other nations on projects to share development costs and to export top of the line equipment to reach economies of scale. Indeed, South Korea's long term research and development strategy is to hold the US closely as a partner and use the developments spun off US research and development.¹⁹

Offsets are a significant concern. An OMB study found that of \$22.4 billion in US exports contracts from 1980 to 1984, offsets of various types totaled \$12.3 billion. There has been a dramatic increase in the number of international corporate alliances and subcontract arrangements in US sales. In 1986, there were only six US-European defense industrial cooperative arrangements; in 1989, there were thirty-three.²⁰

Two cases though will illustrate the difficulty for the seller of using offsets. In the first case, to close the sale of F/A18s to Switzerland, McDonnell Douglas negotiated an offset that was of greater value than the sale. In the second, Boeing had to agree to spend \$1.60 in Britain for each dollar in revenue generated by an AWACS sale to Britain.²¹

The very nature of direct offsets or coproduction allows a foreign entity to become a supplier or subcontractor to the US prime contractor. While this holds down costs to the buyer as intended, it works against the seller's balance of payments. It also

tends to encourage overcapacity and creates tough sales competition. Using direct offsets to help expand international sales may help the prime's situation, but it may not help the economy as a whole because of the reduced domestic subcontracting.

Technology Transfer Concerns

Technology is spreading; nations are willing to sell their advanced equipment and the means to produce the equipment outside their borders. For instance:

- The US: sold AWACS to Saudi Arabia;
sold South Korea and Turkey the means to produce advanced
fighter aircraft;
licensed and equipped Egypt to build M1 tanks.
- The USSR: sold MiG 29 and SS 21 surface to surface missiles to Syria;
leased a nuclear submarine to India;
furnished India the technology to produce MiG 27 fighters and T72
tanks.
- Germany: is helping Brazil, India, and South Korea build diesel
submarines.²²

As warfare changed and, at least in the Gulf War, became more public, there has been steady pressure to export higher and higher weapons capabilities. Lobbies of officers in developing countries are more vocal about wanting higher technology weapons and are more powerful. Finally, there is a practical problem any supplier faces of unilaterally exercising restraint in selling high technology weapons when the technology is available in the marketplace.

With regard to the US industry, the primary concern is an adversary gaining an advantage using US technology. Previously this referred to communist governments incorporating US state of the art technology as could have been the case in 1985 when an Iranian F14 was reportedly flown to the USSR for inspection. Most Third World defense industries cannot quickly incorporate leading edge technology.²³

Practically, the movement of technology has not yet affected the ability of the US to maintain a defense industrial base. The percentage of sales achieved remains relatively constant, driven as it is by the low percentage of US defense production sold on the international market.²⁴

In the use of joint ventures, licensed production, codevelopment, and direct offsets, US companies played a significant part in the transfer of advanced technologies to Europe and Japan. This migration of sensitive information contributed to the development of centers of advanced defense industry technology in Europe, the western Pacific, and now in developing nations.²⁵ Conversely, although there were several client states, the USSR did nothing to build industries in customer countries, except in India.²⁶

Technology transfer is not inherently bad. Logistically, multiple sources for a type of product reduce the risks to sustainability as the product becomes generally available to anyone who can pay for it. At the same time, politically there is reduced control of the product and, from the US point of view, increased risk to the technological superiority of US equipment.

Policy Options

International arms transfers have built up a dangerously armed world. A question which should be addressed by supplying nations, and certainly by the US as a leading supplier, is should there be some attempt to limit these transfers of arms or should each simply sell to the extent the market will bear?

The two extremes of the argument and their supporting rationales are easily found: what will be harder to find is that balance each nation must achieve between contributing to peace in the world while insuring their own defense and developing their domestic economies. One argument is not to sell at all and, if you must, certainly don't provide the high technology goods nor advanced technology itself. If you don't provide the goods, you can prevent the development of arms races and, if you restrict the movement of the necessary technology, leverage remains that can be exerted to modify the actions of others. Proponents tend to feel there is greater value in industry directed toward civil pursuits rather than arms. There is less concern, therefore, over the economic dislocation that would follow a nation's withdrawal from the marketplace.

Advocates of reducing or stopping arms transfers, particularly high technology ones, point out that the weapons and technology being passed may have greater endurance than the goodwill of the buying nation. The US provided Iran considerable goods as a hedge against the Soviet Union, but later saw those goods used against Iraq. With \$3 billion in sales of Mirage fighters and Exocet missiles, France was the largest recent supplier to Iran. Germany was embarrassed during the Gulf War by revelations concerning its involvement in developing Iraqi capability to produce weapons of mass destruction.²⁷ Indeed, the US Commerce Department approved \$1.5 billion in

militarily useful technology to Iraq from 1985 to 1990, including items which could be used for the manufacture of nuclear and chemical weapons and ballistic missiles.²⁸

Previously, the primary reasons for arms transfers were to control, or foster, the spread of communism. With the fall of the Soviet Union, this is no longer the case and the controls that were present in a bipolar world are no longer present. The political orientations of nations are now much more complex. Since one cannot discern accurately future orientations, restraint is seen to be the safest strategy.

The opposing view is that restraint does not work for several reasons. First, it is easier to impose sanctions on allies, who are buying the goods and technology, than enemies. This establishes a situation of logistic inequality. Second, technology and the capability to produce arms have spread to the point that if the transfer cannot be effected by one nation, a buyer will simply go to another. This spread of technology implies a nation's control over the distribution of a product is weaker. Restriction of sales, then, has reduced value as a policy instrument to insure peace. Indicative of the willingness to supply arms in an unstable environment, listed below is the percentage of a supplying nation's total arms exports going to nations at war:²⁹

Brazil	40%
China	43%
Egypt	86%
France	25%
Libya	46%
Syria	99%

USSR 28%

These sales are not merely unthinking or irresponsible; they were frequently made for economic gain. Former communist countries are finding their arms industries many are one of the few industries that can compete internationally and are selling current inventories. Certainly Brazil, with its developing industry, is eager for sales. France and to a lesser degree the UK and Germany, whose defense industries are dependent on exports for economies of scale are willing to make sales the US would not. In 1985, the US unilaterally restricted \$6 to 9 billion in high technology sales that were made without restriction by other countries.³⁰ US defense industry businesses remain interested in expanding foreign sales as domestic programs dwindle. These sales will be especially important and politically sensitive in the US as the defense industrial overcapacity has not been reduced. Appendix A tabulates the value of arms transfers to a nation's economy. For many countries, these transfers are an important source of revenue and, in many developing nations, a growing one.

The truth of arms transfer policy will lie somewhere between the two positions. Each country must find its mix of the two. After the Gulf War, major suppliers urged restraint. However, immediately after they conducted brisk business:

- France sold a record amount in 90 sales
- The US proposed a record \$33 billion in foreign sales for 1992
- Russia made a \$1.5 billion tank sale to Pakistan and hoped to earn \$15-20 billion in 1992³¹

Nevertheless, there was action to encourage multilateral restraint by developing

transparency in reporting of sales. These developments include:

- Agreeing to exchange current year military budget data in Europe.
- Establishing an arms transfer registry under the UN Secretary General.
- Considering further reporting under the UN.

Conclusion

Nations establish a defense industrial base and engage in international arms transfers for several reasons. Arms transfers offer a way to improve the domestic economy as well as improving the state of the military in the country. These sales allow a country with rather limited demand to reach economies of scale. By doing so, the nation may develop a degree of autonomy it would not otherwise reach. By engaging in one of the forms of offset or by entering into a collaborative agreement with a more advanced partner, technology and experience may be developed within the country. As economies develop, there is increasing demand for more advanced technology. Therefore, most recent arms transfers included transfers of increasingly advanced technology. To date, suppliers were willing to allow this migration of technology. Some, such as the French, were willing to provide turnkey high technology operations. This is a trend not likely to stop.

Simultaneously, there are several advanced nations, primarily European and US, with arms industries that make important contributions to their economies. Worldwide arms transfer expenditures are trending down as are the domestic defense budgets in those high technology countries. Overcapacity and reduced domestic consumption are driving increased competition for arms sales. To compete, companies will supply

technologically advanced systems and the underlying technology. Middle eastern and western Pacific countries are the areas with potential growth in imports. Frequently, countries such as Saudi Arabia can demand technology that might not otherwise be sold.

The trends in arms industry development, including the growth of collaboration and licensing, suggest an increasingly internationalized industrial base with a significant technology flow. Trying to make foreign policy use of the control of advanced systems and technology in this environment will become increasingly futile.

Endnotes

1. US Arms Control and Disarmament Agency, World Military Expenditures and Arms Transfers 1990, Government Printing Office, Washington, D.C., 1990, p. 8.
2. James F. Miskel, "National Defense Requirements: The Foreign Connection," Global Affairs, Winter, 1992, p. 152.
3. William D. Hartung, "Curbing the Arms Trade: From Rhetoric to Restraint," World Policy Journal, Spring, 1992, p. 223.
4. David Hughes, "Raytheon's Five Year Plan Stresses Overseas Military Sales, ATC Systems," Aviation Week and Space Technology, June 1, 1992, p. 71.
5. US State Department and US Defense Security Assistance Agency, Congressional Presentation for Security Assistance Programs Fiscal Year 1992, p. 6.
6. Congress of the United States Office of Technology Assessment, Global Arms Trade. Commerce in Advanced Military Technology and Weapons, Government Printing Office, Washington, D.C., 1991, pp. 1 and 15.
7. Amy Borrus, Seth Payne, James Ellis, Geoffrey Smith, "A New World Order for US Arms Makers," Business Week, November 25, 1991, pp. 48-49.
8. Unless otherwise noted, the statistical data in this section of the paper were extracted or derived from the US Arms Control and Disarmament Agency publication World Military Expenditures and Arms Transfers 1990, previously cited.
9. Frederick Clairmonte, "The World's Top Arms Merchant," World Press Review, September, 1992, p. 14.
10. Ian Anthony, "The International Arms Trade," Disarmament, Volume XIII, Number 21990, p. 236.
11. Stephen C. Daffron, "US Arms Transfers: New Rules, New Reasons," Parameters, Spring, 1991, pp. 77-91.
12. Ralph Sanders, Arms Industries: New Suppliers and Regional Security, National Defense University Press, Washington, D.C., 1990, p. 99.
13. Ian Anthony, "The International Arms Trade," p. 237.
14. Ralph Sanders, Arms Industries: New Suppliers and Regional Security, pp. 103-104.
15. Eitan Barnaby Kapstein, "International Collaboration in Armaments Production: A Second Best Solution," Political Science Quarterly, Volume 106, Number 4, 1991-1992, p. 659.
16. Congress of the United States Office of Technology Assessment, Global Arms Trade, p. 7.
17. Ralph Sanders, Arms Industries: New Suppliers and Regional Security, p. 128.

18. Congress of the United States Office of Technology Assessment, Global Arms Trade, pp. 8, 9, 13, 25.
19. Ibid, pp. 15 and 25.
20. Congress of the United States Office of Technology Assessment, Global Arms Trade, p. 25.
21. Stephen C. Daffron, "US Arms Transfers: New Rules, New Reasons," p. 87.
22. Michael T. Klare, "Who's Arming Who? The Arms Trade in the 1990's," Technology Review, May-June, 1990, p. 48.
23. Ibid, p. 120.
24. Ralph Sanders, Arms Industries: New Suppliers and Regional Security, p. 109.
25. Congress of the United States Office of Technology Assessment, Global Arms Trade, pp. 7 and 13.
26. Ralph Sanders, Arms Industries: New Supplier and Regional Security, p. 117.
27. Congress of the United States Office of Technology Assessment, Global Arms Trade, p. 67.
28. William D. Hartung, "Curbing the Arms Trade: From Rhetoric to Restraint," World Policy Journal, Spring, 1992, p. 221.
29. Ian Anthony, "The International Arms Trade," p. 249.
30. James F. Miskel, "National Defense Requirements: The Foreign Connection," p. 156.
31. William D. Hartung, "Curbing the Arms Trade: From Rhetoric to Restraint," p. 226.

Appendix A

Arms Transfer Impact

This appendix provides information on the impact of arms transfers in various economies for the year 1989. Data for this appendix were extracted from or derived from World Military Expenditures and Arms Transfers 1990, published by the US Arms Control and Disarmament Agency.

The gross domestic product is provided for each country to give a feel for the size of the economy relative to that of other countries. The ratios of the country's total military expenditures and arms imports to the gross domestic product indicate the burden the entire military establishment and arms imports place on the nation's economy. The ratios of arms imports and exports to the nation's total imports and exports indicate the significance of arms imports and exports in relation to the nation's total international commerce.

The value of arms imports and exports refer to goods and related services delivered during the year as opposed to contracted for future delivery. For noncommunist countries, the dollar values are direct conversions of the domestic currency to dollars. For communist countries, however, the values represent the estimated value of the good or service in the United States.

ME/GDP - military expenditures divided by gross domestic product, in dollars

AI/GDP - arms imports divided by gross domestic product, in percent

AE/GDP - arms exports divided by gross domestic product, in percent

AI/TI - arms imports divided by the nation's total imports, in percent

AE/TE - arms exports divided by the nation's total exports, in percent

1989 Data

Country	GDP	ME/GDP	AI/GDP	AE/GDP	AI/TI	AE/TE
	mil \$	%	%	%	%	%
Afghanistan	NA	NA	NA	0	462.3	0
Albania	3800 E	4.1	0	0	NA	NA
Algeria	45290	5.1	1.3	0	6.5	0
Angola	6031	NA	12.4	0	30.0	0
Argentina	54080	3.4	0.1	0.1	1.0	0.6
Australia	270800	2.3	0.2	0	1.5	0.2
Austria	125200	1.1	0.1	0	0.3	0.1
Bahrain	2999	6.5	1.6	0	1.8	0
Bangladesh	2139	1.6	0.6	0	3.3	0
Barbados	1669	0.6	0	0	0	0
Belgium	154600	2.5	0.1	0	0.2	0
Benin	1637	2.0	0	0	0	0
Bolivia	4226	4.3	0.2	0	1.3	0
Botswana	2188	2.8	0.5	0	NA	0
Brazil	462300	NA	0.0	0.0	0.8	0.1
Bulgaria	5885	11.9	0.6	0.3	1.9	1.0
Burkina Faso	2552	NA	0.4	0	NA	NA

1989 Data

Country	GDP	ME/GDP	AI/GDP	AE/GDP	AI/TE	AE/TE
	mil \$	%	%	%	%	%
Burma	16330	3.7	0.1	0	9.5	0
Burundi	1058	2.6	0.9	0	5.3	0
Cambodia	NA	NA	NA	NA	NA	NA
Cameroon	11100	1.3	0.1	0	NA	0
Canada	531000	2.0	0.0	0.1	0.2	0.3
Cape Verde	282	NA	1.8	0	4.5	0
Central African Rep	1088	1.7	0	0	0	0
Chad	1002	NA	1.0	0	NA	NA
Chile	23300	3.4	0.5	0.7	1.8	2.0
China-Mainland	603500	3.7	0.0	0.3	0.2	3.9
China-Taiwan	150200	5.4	0.3	0	0.8	0
Columbia	36890	2.1	0.4	0	3.0	0
Congo	2008	NA	0	0	0	0
Costa Rico	4899	0.5	0	0	0	0
Cuba	35460	3.9	3.4	0	14.8	0.1
Cyprus	4468	0.9	0.9	0	1.7	0
Czechoslovakia	123200	6.8	0.4	0.7	3.5	6.6
Denmark	100400	2.2	0.1	0	0.4	0.1
Dominican Republic	6422	0.8	0.1	0	0.2	0

1989 Data

Country	GDP	ME/GDP	AI/GDP	AE/GDP	AI/TE	AE/TE
	mil \$	%	%	%	%	%
Ecuador	9668	1.7	0.2	0	1.1	0
Egypt	69780	5.5	0.9	0.5	8.1	14.4
El Salvador	6335	4.0	1.1	0	6.4	0
Equatorial Guinea	125	NA	8.0	0	NA	0
Ethiopia	5959	12.8	15.5	0	97.3	0
Fiji	1164	2.2	0	0	0	0
Finland	112800	1.6	0	0	0.1	0
France	954100	3.7	0	0.3	0.1	1.5
Gabon	3119	4.5	0.6	0	3.2	0
Gambia	210	0.7	0	0	0	NA
East Germany	159400	8.8	0.5	0.2	NA	NA
West Germany	1207000	2.8	0.1	0.1	0.3	0.4
Ghana	5134	0.6	0.6	0	NA	NA
Greece	52930	5.9	3.8	0	12.4	0
Guatemala	8208	1.6	0.1	0	0.6	0
Guinea	2550	NA	0.4	0	NA	NA
Guinea-Bissau	167	NA	6.0	0	NA	NA
Guyana	230	2.7	0	0	NA	0
Haiti	2344	1.9	0	0	NA	0

1989 Data

Country	GDP	ME/GDP	AI/GDP	AE/GDP	AI/TE	AE/TE
	mil \$	%	%	%	%	%
Honduras	4622	3.2	0.6	0	3.1	0
Hungary	64740	6.3	0	0.1	0.2	0.2
Iceland	5000	0	0	0	0	0
India	267400	3.1	1.3	0	12.1	0
Indonesia	89370	1.7	01	0	0.5	0
Iran	77540	NA	1.7	0	12.4	0
Iraq	NA	NA	NA	NA	15.8	0.4
Ireland	28900	1.6	0	0	0	0
Israel	44890	12.8	1.6	1.4	5.0	5.8
Italy	860000	2.4	0	0	0.2	0
Ivory Coast	8460	105	0	0	0	0
Jamaica	3231	1.1	0.2	0	0.3	0
Japan	2820000	1.0	0	0	0.7	0
Jordan	4306	12.7	4.4	0.1	8.9	0.5
Kenya	7931	2.7	0.1	0	0.5	0
North Korea	30000	20	1.8	1.3	NA	NA
South Korea	210100	4.3	0.2	0	0.6	0.1
Kuwait	31880	6.2	1.5	0	7.8	0
Laos	NA	NA	NA	NA	45.7	0

Country	1989 Data					
	GDP	ME/GDP	AI/GDP	AE/GDP	AI/TE	AE/TE
	mil \$	%	%	%	%	%
Lebanon	NA	NA	NA	NA	0.4	0
Lesotho	830	NA	0	0	0	0
Liberia	1200 E	4.8	0	0	0	0
Libya	22200	14.9	4.4	0.2	15.7	0.7
Luxembourg	8878	0.9	0.1	0.1	NA	NA
Madagascar	2340	1.5	1.3	0	NA	0
Malawi	1559	2.3	0.3	0	1.0	0
Malaysia	35970	2.9	0.2	0	0.3	0
Mali	2048	2.0	0.5	0.5	NA	NA
Malta	198	1.1	0	0	0	0
Mauritania	943	4.3	2.1	0	9.0	0
Mauritius	4029	0.2	0.2	0	0.4	0
Mexico	186700	0.5	0	0	0.1	0
Mongolia	NA	NA	0	0	NA	NA
Morocco	217	5.5	0.2	0	0.7	0
Mozambique	1106	9.7	10.8	0	NA	NA
Nepal	2811	1.2	0	0	0	0
Netherlands	222500	2.9	0.2	0.1	0.5	0.1
New Zealand	39090	2.2	0.1	0	0.6	0

1989 Data

Country	GDP	ME/GDP	AI/GDP	AE/GDP	AI/TE	AE/TE
	mil \$	%	%	%	%	%
Nicaragua	106	NA	38.9	0	78.2	0
Niger	1987	1.3	0.3	0	NA	NA
Nigeria	27520	0.5	0	0.1	0.1	0.3
Norway	88510	3.3	0.4	0	1.4	0.1
Oman	7635	20.3	0.8	0	2.7	NA
Pakistan	36810	6.8	1.2	0.1	6.4	0.4
Panama	4134	3.4	0.1	0	0.5	0
Papua New Guinea	3375	1.4	1.2	0	2.6	0
Paraguay	4323	1.4	0	0	0	0
Peru	40820	NA	0.4	0	7.5	0
Philippines	43960	2.2	0.2	0	0.6	0
Poland	174700	8.9	0.4	0.2	2.4	1.4
Portugal	44620	3.3	0.1	0.1	0.3	0.3
Qatar	6870	NA	0	0	0	NA
Romania	113400	6.1	0	0.1	NA	NA
Rwanda	2160	NA	0.9	0	6.0	0
Sao Tome	45	NA	11.1	0	NA	NA
Saudi Arabia	91670	16.0	4.6	0	21.2	0
Senegal	4441	2.0	0.1	0	0.4	0

1989 Data

Country	GDP	ME/GDP	AI/GDP	AE/GDP	AI/TE	AE/TE
	mil \$	%	%	%	%	%
Sierra Leone	686	NA	0	0	0	0
Singapore	28890	5.1	0.4	0.2	0.2	0.2
Somalia	1173	NA	2.6	0	NA	NA
South Africa	86750	4.4	0.1	0	0.5	0
Soviet Union	2664000	11.7	0	0.7	0.8	17.9
Spain	370700	2.1	0.2	0	1.0	0.3
Sri Lanka	6939	3.2	0.1	0	0.5	0
Sudan	15640	2.2	0.4	0	5.8	0
Suriname	1319	3.0	0	0	NA	NA
Swaziland	644	1.7	0	0	0	0
Sweden	185800	2.6	0	0.3	0.1	1.1
Switzerland	184300	2.1	0.2	0	0.5	0.1
Syria	19320	11.6	5.2	0	47.7	0
Tanzania	2642	4.1	1.5	0	3.1	NA
Thailand	68770	2.7	0.3	0	1.0	0
Togo	1292	3.3	0.4	0	NA	NA
Trinidad and Tobago	3735	4.4	0	0	0	0
Tunisia	9616	7.4	0.2	0	0.5	0
Turkey	77280	17.2	1.4	0	7.0	0

1989 Data

Country	GDP	ME/GDP	AI/GDP	AE/GDP	AI/TE	AE/TE
	mil \$	%	%	%	%	%
Uganda	4045	NA	05	0	3.1	0
United Arab Emirates	27760	5.3	3.1	0	8.5	NA
United Kingdom	834400	4.2	0.1	0.4	0.3	2.0
United States	5201000	5.8	0	0.2	0.3	3.1
Uruguay	8066	NA	0.2	0	1.7	0
Venezuela	41460	1.0	0.2	0	1.0	0
Vietnam	14200 E	NA	9.2 E	0	NA	NA
Yemen-North	6776	9.1	6.2	0	NA	NA
Yemen-South	1273	NA	18.1	0	NA	NA
Yugoslavia	58640	3.6	0.2	0.3	0.8	1.1
Zaire	9152	NA	0	0	0	0
Zambia	4655	1.4	1.3	0	6.5	0
Zimbabwe	5742	6.7	.2	0	NA	NA